The Put-Call Parity Theorem

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Abstract

Just remember "stock + put = bond + call".

1 The Put-Call Parity Theorem

Theorem 1 *For a given time to expiration t and strike price E let:*

S *= the current value of a non-dividend paying stock or other asset.*

P *= the current value of a European put option on the asset with strike price E and time to expiration t.*

B *= the current value of a risk-free zero-coupon bond with value at maturity E and time to maturity t.*

C *= the current value of a European call option on the asset with strike price E and time to expiration t.*

Then in the absence of arbitrage opportunities:

$$S + P = B + C$$

Corollary 1 *If r is the current risk-free continuously compounded interest rate for time period t then:*

$$S + P = e^{-rt}E + C$$

Corollary 2 *If $E = Se^{rt}$ = the forward price of the asset, then $C = P$.*

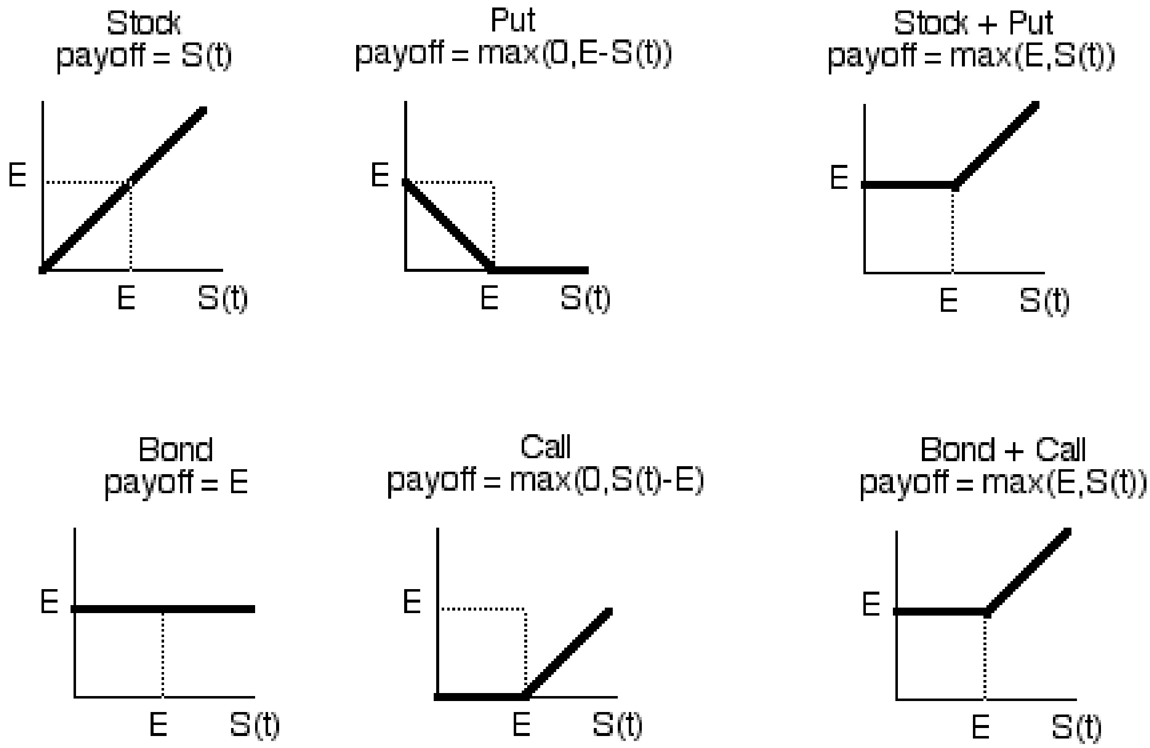

Figure 1: Payoffs

Proof:

Consider the values or "payoffs" at expiration time t as functions of the value $S(t)$ of the underlying asset at time t as shown in Figure 1.

The stock+put and bond+call combinations have the same payoffs in all possible future states of the world. We are assuming no arbitrage opportunities, so the law of one price holds and their current values must be the same.

The corollaries follow immediately.